MARCONI

MARCONI, GUGLIELMO (*b.* Bologna, Italy, 25 April 1874; *d.* Rome, Italy, 20 July 1937), *engineering, physics.*

Marconi was the second son of Giuseppe Marconi, a wealthy landowner, and his second wife, Annie Jameson, the daughter of an Irish whiskey distiller. His limited formal education, of early private tutoring followed by several years at the Leghorn lyceum, included special instruction in physics. His first wife, Beatrice O'Brien, was of an aristocratic Irish family; his second, Maria Bezzi-Scali, belonged to the papal nobility. Marconi was always a devoted citizen of Italy, and frequently acted in an official capacity for his government. Chief among the many honors awarded him was the Nobel Prize for physics, which he shared with K. F. Braun in 1909.

Marconi seems to have first learned in 1894 of Hertz's laboratory experiments with electromagnetic waves. He was immediately curious as to how far the waves might travel, and began to experiment, with the assistance of Prof. A. Righi of Bologna. His initial apparatus resembled Hertz's in its use of a Ruhmkorff-coil spark gap oscillator and dipole antennas with parabolic reflectors, but it replaced Hertz's spark-ring detector with the coherer that had been employed earlier by Branly and Lodge. Marconi quickly discovered that increased transmission distance could be obtained with larger antennas, and his first important invention was the use of sizable elevated antenna structures and ground connections at both transmitter and receiver, in place of Hertz's dipoles. With this change he achieved in 1895 a transmission distance of 1.5 miles (the length of the family estate), and at about the same time conceived of "wireless telegraph" communication through keying the transmitter in telegraph code.

Marconi was unable to interest the Italian government in the practical potentialities of his work, however. In February 1896 he moved to London, where one of his Irish cousins, Henry Jameson Davis, helped him prepare a patent application. Davis also arranged demonstrations of the wireless telegraph for government officials and in 1897 helped to form and finance the Wireless Telegraph and Signal Co., Ltd., which in 1900 became Marconi's Wireless Telegraph Co., Ltd. By the latter year Marconi had experimentally increased his signaling distance to 150 miles, and had decided to attempt transatlantic transmission. A powerful transmitter was built at Poldhu, Cornwall, England, and a large receiving antenna placed on Cape Cod, Massachusetts. When the latter blew down in 1901, Marconi, who was anxious to forestall any competitors, sailed for Newfoundland where, using a kite-borne antenna and Solari's carbon-on-steel detector with a telephone receiver, on 12 December he received the first transatlantic wireless communication, the three code dots signifying the letter "S." Already well

known, Marconi, at twenty-seven, became world famous overnight.

From 1902 Marconi devoted more of his time to managing his companies, which by 1914 held a commanding position in British and American maritime radio service. (The Radio Corporation of America was formed in 1919, partly to acquire his United States interests.) Throughout his career Marconi was exceptionally fortunate in his ability to attract highly qualified employees and consultants; among them J. A. Fleming, inventor of the thermionic diode; H. J. Round, who developed the triode as a radio-frequency oscillator and amplifier independently of De Forest; R. M. Vyvyan, who installed many of the early spark stations; and C. S. Franklin, designer of directional antennas. It was Franklin who—drawing upon Marconi's earlier notion of exploring the communication potentialities of shortwaves by employing dipole antennas with highly directional reflectors—in 1920 developed such dipole antennas into a beamed radio-telephone circuit between London and Birmingham, operating at 20 MHz. Following a series of discoveries (made by radio amateurs, among others) that indicated the feasibility of establishing a 10,000-mile shortwave communication network, operable by both day and night, Marconi's company completed a globe-girdling system of shortwave beam stations in 1927.

From 1921 on Marconi had used his steam yacht *Elettra* as home, laboratory, and mobile receiving station in propagation experiments. In 1932 he discovered that still higher frequency waves (microwaves) could be received at a point much farther below the optical horizon than had been predicted by any theory. This phenomenon was exploited in later "scatter propagation" circuits, which added new reliability to communications in arctic regions.

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